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PRESENT AND FUTURE TRENDS IN THE USE OF PLASTICS, PAPER AND BOARD FOR PACKAGING AND DISTRIBUTION

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PRESENT AND FUTURE TRENDS IN THE USE OF PLASTICS, PAPER AND BOARD FOR PACKAGING AND DISTRIBUTION

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1. (a) Packaging is one of the great growth industries of modern times. The industry itself is, however, quite old and there are packaging companies in England and elsewhere with a record of continuous activity for nearly two hundred years. These companies are mostly converters of paper and paper products; for paper, in addition to being one of the most widely used of packaging materials, is also one of the oldest.

Plastics, by way of contrast, are very new in the packaging field. Plastic bottle closures made of thermosetting materials have been with us for many years. But the thermoplastic materials are very new, most of them having been developed within the last thirty years. It is this group of materials with which this paper is most concerned; for either by themselves or in conjunction with paper and other materials, they possess individual properties of the greatest possible value in the packaging field.

(b) These materials have appeared at a time of almost continuous growth and expansion in the packaging industries of the world. For packaging is an intermediate service industry, providing the agricultural and manufacturing industries of a country with the means to distribute their products. The consumption of packaging materials tends therefore to be a barometer of economic progress, and to grow in volume and sophistication with the social and economic development of individual countries. It follows therefore that a country's packaging industry is more than usually sensitive to the major factors affecting the national economy. Its growth follows very closely the pattern of the growth of the national income as a whole. It reflects changing patterns in consumer expenditure. It must repond to changing technologies in production not only of food but of many other manufactured goods. Finally it is affected by changing fashions in

marketing, advertising and distribution - all of which again are seeking continuously to adjust themselves to the tastes and fashions of the consuming public.

2.(a) On the whole the packaging industries of the world have met this challenge with outstanding success. The tinplate can and the glass bottle in particular have sustained a remarkable rate of growth both in England (see Table 1. in Annex) and in many other countries of the world.

(b) Progress has, however, been most spectacular amongst the "soft" packaging materials - plastics, paper and board. For these materials are particularly well placed to exploit modern trends, both in manufacture and distribution. They are well suited to the packaging of frozen and dehydrated foods which represent the major recent advance in food technology. Their low cost and light weight make them attractive for the packaging of small or individual units, particularly in the field of pharmaceuticals. Finally, the rapid growth of branding and of self service distribution has created a demand for attractive, printed bags and wrappers for a range of goods which were previously either packaged in the simplest possible form, or distributed in bulk with little or no attempt to package in individual retail units.

(c) Table 2. showing the growth in consumption of Polyolefin (plastic) films in various countries, reflects this dynamic progress. It will be seen that in the U.S.A. and France consumption has more than doubled in the past five years, while in Germany there has been a four-fold increase. Some 80% of this film is used for packaging. The United Kingdom figures show similar trends and consumption of plastic film for packaging in 1962 was in the region of 25,000 tons - a figure more than twice as high as that of five years ago. Statistics for other countries of the world are not easily available, but there is little doubt that parallel or even greater advances have been made elsewhere - in India, South Africa, Australia, Latin America and Japan.

(d) Paper packaging has had many years in which to consolidate its growth. But for all that its rate of expansion continues to be very remarkable indeed. Sales of cartons, cardboard boxes and fibreboard cases in the United Kingdom rose from under £100,000,000 in 1954 to over £140,000,000[1] in 1960 - years when the price of paper and board was in decline. Paper consumption in Western Germany has increased in recent years by some 10% per annum; in U.S.S.R. by 11% and in Japan 15%.[2] There is every reason to believe that the increase in packaging papers and boards in these countries was at least equal to the average increase over the paper industry as a whole.

3.(a) Many of the factors which led to this expansion still persist both for paper packaging and for plastics. Firstly there have been huge developments in packing machinery to overcome handling difficulties with some of the newer materials. Manufacturers have been particularly active in Scandinavia, Holland, Western Germany and Japan as well as in England and America. High speed systems have been developed for

forming and filling cartons. These cartons can have a heat seal coating which seals merely with heat and pressure. New machines have speeded up printing and bag making for paper, film and laminates as well as for closing and sealing this wide and complex range of materials. These developments, which have led to cheaper packaging operations and higher efficiences on the production and filling lines, have been matched by the falling price of packaging materials, which themselves have been subject to continual development.

(b) There have been many refinements, for instance, both in the techniques of paper and board manufacture, and most particularly in the techniques of coating and laminating. A number of these developments incorporate other materials, notably plastic films and coatings, and aluminium foils. As a result the paper and board converters have developed a spectacular range of new products - fibreboard outer containers, multi-wall paper sacks, liquid-tight cartons and coated wrappers and cartons for frozen foods and other perishable products.

(c) (i) Developments in plastics have been even more rapid and far reaching. Polythene was one of the earliest thermoplastic materials to be used extensively for packaging - first as a transparent film, and subsequently as moulded packages and components, particularly "squeeze" bottles. Polythene is also extensively used as a heat-seal coating for both paper and aluminium foil; whilst it is also in growing demand as a moisture proof and protective lining for both multi-wall paper sacks and metal drums. More recently polythene is being vacuum formed to produce a hermetically-sealed container for frozen foodstuffs. Nearly 50% of all the polythene consumed in the United Kingdom is now used for packaging. This rapid growth has been stimulated both in England and elsewhere by a continuous decline in polythene price and also by technical developments both in the polymers and in processing techniques. As a result, polythene today is not only one of the most widely used packaging materials but also one of the cheapest.

(ii) Polystyrene is another of the "older" plastic materials to benefit both from a continuous fall in price and from successful technological progress. It has flow characteristics which make it particularly suitable for injection moulding and it is therefore widely used for can and bottle components as well as for injection moulding containers. More recently it has been used for vacuum forming - a process particularly popular for drinking cups, tubs and for the packaging of fruit juices and other liquid products. Finally it has been discovered that extruded polystyrene acquires most valuable properties by stretching in both directions, known as bi-axial orientation. A film of this material, brilliantly clear and most attractive in appearance, is now being produced both in America and Europe.

(iii) The latest arrival on the scene is Polypropylene, a material of most exciting properties with a wide range of uses in the packaging field. Once more it seems probable that its biggest use will be as bi-axially oriented film. This film is already being produced in America and

production is expected in the near future in England, Belgium and Japan. The film is very clear; it has useful protective qualities and because it can be produced in very thin gauges it will compete in price not only with cellulose film with which it is already competitive, but eventually with polythene and the cheaper plastic materials.

(iv) It is not possible in this paper to describe all the recent developments in plastic materials. Both Polyvinyl Chloride (P.V.C.) and Polyvinylidene Chloride are materials which have been extensively used for some years but which continue to find new applications in the packaging field. There are new groups of materials also - such as the polycarbonates which are only just appearing on the packaging scene. And others, such as Polyester films where full exploitation has so far been limited by the cost of the material. These, and many others, will undoubtedly help to sustain the lively and competitive atmosphere which is the main feature of the industry today and which has done more than anything else to sustain its rate of growth and expansion in so many different countries of the world.

4.(a) There seems little doubt, therefore, that both in paper and plastics the packaging industries of the world are set for an expansion in the future, at least as great as they have enjoyed in the past. It remains, therefore, to consider whether the trends amongst the package consuming industries are following a similar course, in particular whether they are likely to create a demand for packages on a scale which will justify all the development effort of the packaging industries and fill the productive capacity which these industries have already created or plan to create in the future.

Here it is important to bear in mind once again the major features which have supported the growth in packaging in recent years:

a) Rapid advances in the technology of the package consuming industries, particularly in manufactured foodstuffs.
b) Changes in marketing and distribution.
c) Changes in social tastes and consumer habits.
d) Increasing expenditure on packaging with the growth of national incomes.

An examination of these factors will show that while the rate of advance in certain countries of the world may be less rapid than in the past, there are many countries in the world where packaging consumption is still very low and where there is every hope that the rate of growth will be very rapid indeed. And for many reasons, both technical and commercial, it is the paper and plastic industries which are likely to benefit most from increased package consumption amongst the less developed nations of the world.

(b) (i) The trends in marketing and distribution are in favour of the "soft" packaging materials - particularly transparent plastic films. Modern marketing involves the branding of the product and a high level of presentation and display. The product has often to sell

itself, backed only by mass advertising and promotion aids. The self service store is the ultimate in this form of distribution, and despite the rapid increase in self service distribution, there is every reason to expect an even faster expansion in the future. In America nearly 60%[3] of grocery outlets are now self service, and it is estimated that some 90%[4] of all food sales in that country are made in this way. Table 3 in the Annex shows the comparative development in various European countries.

(ii) Current progress appears to be fastest in Germany, where there are said to be 30,000 self service stores, accounting for 35 - 40% of all retail food sales.[5] In Britain, progress[6] whilst slower, has also been very great and there are now 8,800[6] self service stores in the country. In all countries, self service distribution has extended far beyond foodstuffs, and the modern supermarket sells the widest range of goods from textiles to refrigerators. Nor is this development confined to Europe. There are supermarkets in Kenya, Singapore, Indonesia, Iran and many other countries of the world.

(iii) Self service demands that every article sold should be individually packaged and clearly marked with price and contents. As a result, packaging has extended far beyond the range of manufactured goods. In particular, pre-packaged fresh produce accounts for a vast tonnage of plastic film, wrappers and cartons. Basic commodities such as potatoes, fruit, meat, butter, cheese and eggs all now fall within the scope of the packaging industry. They all present difficult technical problems to the package manufacturer, and most of them offer unlimited opportunities for expansion in the future.

(c) We have already referred to recent advances in food technology - particularly quick-freezing and dehydration. The technique of both freezing and drying continues to advance and there is a steady improvement in the quality, range and presentation of the products. Quick frozen foods are successfully packed in cartons, plastics or films. Plastic coated board is increasingly used for the carton; in this way it has been possible to design high-speed filling and sealing lines and at the same time provide a greater degree of protection for the product. Many dehydrated products - such as soup and "instant" potato - are packed in laminated pouches made of paper, film and in some instances, metal foil. Accelerated freeze-drying, however, produces a most brittle and friable product and its successful packaging calls for considerable ingenuity. A number of experimental packs have been developed, incorporating paper, board and the newer plastic films. Whatever the ultimate form of packaging there is no doubt that the process offers exciting possibilities for the distribution of perishable goods. Powdered milk is another product to turn to a combination of paper and plastics for its newer forms of packaging, whilst vacuum packaging of bacon makes use of a coating of polythene on to a cellulose film - a film which in turn has often itself been previously coated with Polyvinylidene Chloride, and the print is sandwiched hygienically between the two films.

(d) There are numerous other developments which promise equally great opportunities for both paper and plastic packaging. Many products, particularly food and pharmaceutical, are now offered in small individual units. Flexible packages of paper, film or laminates reduce the packaging cost to a minimum. They give adequate protection to the product and provide a simple method of sealing and dispensing. Many products which were previously sold as powders or pastes now are offered in liquid form for convenience of dispensing and application. Detergents, bleaches and household polishes are outstanding examples; they account for a very substantial proportion of the world demand for polythene bottles.

Motor oil is already appearing in its first plastic packs. A start has also been made with soft drinks, liquid milk and even wine. Indeed the variety of products is endless and between them they should ensure a continuing and growing demand for both paper and plastic packaging.

5.(a) These trends and developments, many of which started in America, are already spreading throughout the world. Moreover there are a number of applications which are either being pioneered in the less developed countries or which are already being extensively exploited there because of some particular local circumstances. So far as agricultural products are concerned packaging is already well developed in many countries, much of it carried out in co-operative pack houses. In this way the products of both tropical and temperate climates are prepared not only for domestic consumption but also for the requirements of the export markets.

(b) There are also other more specialized packaging developments in many countries. Plastic films are being widely used as a container for saplings and seedlings in a number of countries in Africa and Asia. Cocoa plants are being wrapped in Ghana, tobacco plants in Rhodesia, coffee plants in Kenya. In Malaya trials are being carried out on a system of planting rubber saplings at certain stages in a black polythene bag. It is hoped that this system will permit tapping to start after five years instead of the usual seven. Polythene shrouds are being widely used for wrapping bananas in Jamaica, in the Windward Islands, in Central America and in West Africa. Both plastics and paper are being used in East Africa for the packaging of liquid milk. Nigeria is packing large quantities of sweets in plastic bags, and Gari, a food made from the roots of a shrub which is widely consumed in West Africa, may in the near future be pre-packed in a plastic bag.

(c) Heavy duty polythene sacks are being extensively developed for the packing of fertilizer, chemicals and animal foodstuffs. In India there is a large usage of polythene as a lining material for either paper or jute sacks. Other products which are currently being packed in polythene are wax in Borneo and wet fish, which has been transported by air in bags from Iceland.

(d) India has made progress in single-unit pilfer-proof packs. Indeed a pavilion at the India Industries Fair in 1961 focused attention on the success of pilfer proof packaging in combating the adulteration of foodstuffs and trafficking in spurious drugs. There are various products packed in laminations. These include dried fruit in South Africa, medicine tablets in strip packs in Pakistan and other countries, and nuts and dried peas. Rice, sugar and salt are all commodities suitable for packaging in paper or plastics. Others, particularly perhaps ghee and fatty products, still present a technological problem for the future.

6.(a) In this paper I have described new trends in manufacture and distribution which quite clearly reflect a major revolution in the tastes and preferences of the consuming public. There is a continuing emphasis on "convenience foods" and on the familiarity and security of brand names associated with uniform standards of quality, safety and hygiene. Moreover, there is the complexity of individual requirements which arise from higher standards of living and from personal budgets, which reach beyond the basic necessities of day to day existence.

(b) Many of the trends, of course, have already been fully exploited in a number of countries of the world. In the U.S.A. in particular it would be unwise to expect a rate of progress in future equal to that of the last ten years. In Western Europe many of the trends have still to develop real momentum; in a number of countries they have scarcely started. Table 4 in the Annex shows the per capita consumption of paper and board (other than building board) in the year 1958. The figures are similar for other packaging materials.

(c) I have also described the increasing uses of packaging in developing countries and the challenges they present. There is no doubt that this challenge will be met. For the manufacture of paper and plastic packaging can commence with a relatively low capital outlay. Technological help is available from the material manufacturers, from the makers of packaging machinery and from the major package manufacturing countries. The materials and processes are well suited to making small packages, a factor of great importance in countries where the purchasing power is low. The packages themselves are light in weight thus reducing costs of transportation and storage. Finally the range of protective qualities is great enough to stand up to most of the extremes of climate and temperature. There can be no doubt that packaging will expand in the less developed countries in view of the variety and significance of their new packaging developments. Between them they must surely ensure for many years ahead a steady rate of growth in the paper and plastic industries of many different countries of the world.

"Table 1" GROWTH OF OLDER PACKAGING MATERIALS IN ENGLAND

Year	Tinplate Consumption used for Containers Thousand Tons	Glass Container Sales - Millions
1948		2,815
1950	380 (estimate)	-
1954		3,530
1958	536	4,050
1961	611	4,545

Sources: Glass Manufacturers Federation. Iron and Steel Board. Although no published figures, estimated that consumption of tinplate food containers has more than doubled in the last five years.

"Table 2" POLYOLEFIN FILM CONSUMPTION (Thousand Tons)

Year	U.K.	U.S.A.	Western Germany	France
1957	8	70	7	5
1959	13.5	104	16	7
1961	23	150	28	13

All figures are estimates based on Polyolefin Consumption figures in British Plastics and Modern Plastics.

"Table 3" GROWTH OF SELF SERVICE STORES

	Number of Self Service Stores		Number of people per Self Service Store (In thousands)		Self Service as a % of Grocery Outlets (Estimated)
	1957	1960	1957	1960	1960
U.K.	3900	8150	12.8	6.4	4.7
Sweden	3515	5451	2.1	1.4	29.0
Germany	3183	22612	17.0	2.2	13.8
Italy	33	400	1507.0	123.0	0.1

Source: O.E.E.C. Report on Self Service Stores in Europe.

"Table 4" PER CAPITA CONSUMPTION OF PAPER AND BOARD IN 1958

	Population (Millions)	lbs. per Head
U.S.A.	174	400
Sweden	7.4	222
U.K.	52	198
Germany	53	145
Italy	49	51
Mexico	32	29
Pakistan	84	2

Source: Pulp and Paper International World Review, 1959.

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